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SYSTEM AND METHOD FOR DELIVERING MEDICAL EXAMINATION, TREATMENT AND ASSISTANCE OVER A NETWORK

The present application is a continuation-in-part of U.S. Patent Application Serial No. 09/855,738, filed May 14, 2001, which is hereby incorporated herein in its entirety by reference.

Field of the Invention and Background Art

The present invention relates to medical examination, diagnosis and treatment, and more particularly, to providing such services over a network.

Health care costs in the United States exceed one trillion dollars per year. In 1996, spending on health care in the United States exceeded fourteen percent of the Gross Domestic Product. Current health care system costs include annual service to over ninety million people in over five thousand hospital emergency departments. These ninety million or more visits impose an enormous burden on emergency departments. Ambulances on route toward the closest available emergency department are often diverted to other hospitals, sometime located in another city. The cause of such calamities is multi-factorial and includes: nursing shortages, bed unavailability, and grossly overcrowded, overburdened emergency rooms.

Telecommunications technologies, and in particular, video-conferencing, offer an opportunity to provide cost effective care in a variety of settings. In particular, tele-medicine and tele-healthcare have been envisioned with respect to many specialties including: pathology, dermatology, surgery, opthamology, cardiology, and radiology. However, diagnosis and treatment in these areas require either a human presenter or mechanical equipment at the patient end to gather pertinent information related to the patient's condition.

For example, it is known in the prior art to provide remote monitoring of patients over a network. U.S. Patent No. 5, 544,646, which is hereby incorporated herein, issued to David et al., discloses an interactive television and audio patient monitoring system for connecting a patient situated at home or in a hospital room with a central monitoring station that is manned by one or more health care practitioners. The invention provides two-way interactive visual communications between a patient and a health care

practitioner via cable television lines whereby the central station may continuously monitor one or more medical parameters (such as, ECG, blood pressure, respiration, etc.) by utilizing medical equipment located in the patient's hospital room or home.

Similarly, U.S. Patent No. 5,810,747, issued to Brudny et al., and also incorporated herein by reference, discloses an interactive training system used for monitoring a patient suffering from neurological disorders of movement. The system includes a patient station that includes a computer in communication with a supervisor station via a local area network or the Internet. Sensors collect physiologic information and physical information from the patient while the patient is undergoing training. This information is provided to the supervisor station to be summarized and displayed to the patient and the supervisor.

U.S. Patent No. 6,168,563, issued to Brown and incorporated herein by reference, discloses a system and method for enabling a health care provider to monitor and manage a health condition of a patient. The system includes a health care provider apparatus operated by a health care provider and a remotely programmable patient apparatus that is operated by a patient. The health care provider develops a script program using the health care provider apparatus and sends the script program to the remotely programmable patient apparatus through a communication network such as the World Wide Web. The script program is computer executable, and provides information to the patient about the patient's health condition by asking the patient questions and receiving answers to the questions. The answers are forwarded to the health care provider through the communication network and processed for further management of the patient's health condition by the health care provider. The patient data may also include information supplied by a physiological monitoring device that is connected to the remotely programmable patient apparatus.

In addition, U.S. Patent No. 6,205,716, issued to Peltz and also incorporated herein by reference, discloses a secure, modular interactive two-way tele-collaborative video conferencing and imaging enclosure for remotely monitoring physiological attributes of a user by medical specialists and remote interaction between users and medical specialists. Access to the system requires participation in a heathcare program or health insurance program, such as an HMO. The healthcare program provides the patient with an "access card" that enables the patient to use the enclosure.

Summary of the Invention

In accordance with a first embodiment of the invention, method for providing a covering physician service via a network includes informing a patient of a practicing physician of the availability of the plurality of patient terminals and referring the patient to one of the patient terminals upon agreement of the patient. A call from the patient at the patient terminal is received at a call center, the call center enabling any of a first plurality of physician terminals to be in audio-visual communication over the network with any of a second plurality of patient terminals, and the call is routed to an available physician at one of the physician terminals so that the available physician may carry on a two-way conversation with the patient and visually observe the patient. The available physician is permitted to make an assessment of the patient and to treat the patient.

In accordance with a related embodiment, the method may further include receiving information related to the patient at the physician terminal via the network and/or forwarding information related to the patient to the practicing physician via the network following interaction of the patient with the available physician. Similarly, the method may include forwarding information related to the patient to a health care management system associated with the physician. The health care management system may be a healthcare management organization, a point of service health care system, or a preferred provider organization.

In accordance with another embodiment of the invention, a method for providing a covering physician service via a network includes informing a patient of a practicing physician of the availability of the plurality of patient terminals and referring the patient to one of the patient terminals upon agreement of the patient. A call from the patient at the patient terminal is received at a call center, the call center enabling any of a first plurality of health care practitioner terminals to be in audio-visual communication over the network with any of a second plurality of patient terminals. The call is routed to an available health care practitioner at one of the health care practitioner terminals so that the available health care practitioner may carry on a two-way conversation with the patient and visually observe the patient. The available health care practitioner is then permitted to make an assessment of the patient and to treat the patient.

In accordance with a related embodiment, information related to the patient may be received at the health care practitioner terminal via the network and/or information related to the patient may be forwarded to the practicing physician via the network

following interaction of the patient with the available physician. Similarly, information related to the patient may be forwarded to a health care management system associated with the physician. The health care management system may be a healthcare management organization, a point of service health care system or a preferred provider organization. The health care practitioner may be a nurse practitioner or an internist.

In accordance with a further embodiment of the invention, a method for delivering medical examination, diagnosis, and treatment services from a physician to a patient over a network includes providing a call center enabling any of a first plurality of health care practitioner terminals to be in audiovisual communication over the network with any of a second plurality of patient terminals. A call is received at the call center from a patient at one of the patient terminals routed to an available health care practitioner at one of the health care practitioner terminals such that the available health care practitioner may carry on a two-way conversation with the patient and visually observe the patient. The available health care practitioner is permitted to make an assessment of the patient and to conduct an examination of the patient over the network, including by a visual study of the patient.

In accordance with a related embodiment, the method may also include having the patient stand in the course of the examination, so as to provide a basis for a gross evaluation of patient condition. In accordance with another related embodiment, making an assessment may include making an assessment in accordance with a protocol. In accordance with further related embodiments, providing a call center enabling any of a first plurality of heath care practitioner terminals to be in audiovisual communication over the network with any of a second plurality of patient terminals may include providing a second plurality of patient terminals such that unrestricted access to one or more of the patient terminals is permitted and/or receiving a call at the call center from a patient may include providing a telephone in one or more of the patient terminals that permits direct access to the call center upon lifting the receiver. In accordance with other related embodiments, making an assessment in accordance with the protocol may include making an assessment in accordance with a protocol stored in a database and/or making an assessment in accordance with the protocol may include displaying in real time a relevant segment of the protocol to the available physician. Similarly, permitting the physician to prescribe a treatment may include permitting the physician to refer the patient to a third party for treatment and/or referring the patient to a third party for treatment may include

referring the patient to one or more of a primary care physician, specialist, hospital, emergency room, ambulance service or clinic. Referring the patient to a third party may additionally include communicating with the third party via an electronic link included in a relevant segment of a protocol stored in a protocol database resident on a digital storage medium and the electronic link may be a hypertext link.

In accordance with further related embodiments, permitting the physician to prescribe a treatment may include, when a treatment is being prescribed by a physician, communicating a prescription over the network to a pharmacy and/or communicating the prescription over the network to the pharmacy may include communicating to the pharmacy instructions to be given to the patient pertaining to the treatment of the patient. Communicating the prescription over the network to the pharmacy may also include communicating the prescription to the pharmacy via a hypertext link included in a relevant segment of a protocol stored in a database resident on a digital storage medium. In accordance with another related embodiment, permitting the physician to conduct the examination may be accomplished under conditions such that the examination is conducted without medical instruments at the patient terminal where the patient is located.

In accordance with another embodiment of the invention, a system for delivering medical examination, diagnosis, and treatment services from a physician to a patient over a network includes a first plurality of health care practitioner terminals, each of the first plurality of health care practitioner terminals including a display device and a second plurality of patient terminals in audiovisual communication over a network with any of the first plurality of health care practitioner terminals. A call center is in communication with the patient terminals and the health care practitioner terminals, the call center routing a call from a patient at one of the patient terminals to an available health care practitioner at one of the health care practitioner terminals, so that the available health care practitioner may carry on a two-way conversation with the patient and visually observe the patient. A protocol database resident on a digital storage medium is accessible to each of the health care practitioner terminals. The protocol database contains a plurality of protocol segments such that a relevant segment of the protocol may be displayed in real time on the display device of the health care practitioner terminal of the available health care practitioner for use by the available health care practitioner in making an assessment of the patient.

In accordance with related embodiments, the relevant segment of the protocol displayed in real time on the display device of the health care practitioner terminal may include an electronic link that establishes communication between the available health care practitioner and a third party and the third party may be one or more of a primary care physician, specialist, hospital, emergency room, ambulance service, clinic or pharmacy. The electronic link may be a hypertext link.

In accordance with further related embodiments, the system may also include a patient database accessible to each of the health care practitioner terminals for storing patient information and the patient information may be displayed on the display device of the health care practitioner terminal of the available health care practitioner. Similarly, the system may include a medication database accessible to each of the physician terminals for storing medication information. Additionally, each patient terminal may be configured to permit the available health care practitioner to conduct an examination of the patient, including by visual observation of the patient, while the patient is standing.

In accordance with other related embodiment, the patient terminals may include a telephone such that a patient may establish a direct connection to the call center by picking up the telephone receiver. Further, the protocol database may be resident on a server that is in communication with each of the health care practitioner terminals and each of the health care practitioner terminals may include a local storage device and the protocol database is replicated on the local storage device of one or more of the physician terminals.

In accordance with yet another embodiment of the invention, a system for delivering medical examination, diagnosis, and treatment services from a physician to a patient over a network includes a first plurality of health care practitioner terminals, each of the first plurality of health care practitioner terminals including a display device and a second plurality of patient terminals in audiovisual communication over a network with any of the first plurality of health care practitioner terminals. A call center is in communication with the patient terminals and the health care practitioner terminals. The call center routes a call from a patient at one of the patient terminals to an available health care practitioner at one of the health care practitioner terminals, so that the available health care practitioner may carry on a two-way conversation with the patient and visually observe the patient.

In accordance with a further embodiment of the invention, a system for delivering

medical examination, diagnosis, and treatment services from a physician to a patient over a network includes a first plurality of health care practitioner terminals, each of the first plurality of health care practitioner terminals including a display device and a second plurality of patient terminals in audiovisual communication over a network with any of the first plurality of health care practitioner terminals. Each of the second plurality of patient terminals includes a camera having pan, tilt and zoom modes, such modes being controlled from the first plurality of health care practitioner terminals. A call center is in communication with the patient terminals and the health care practitioner terminals and the call center routes a call from a patient at one of the patient terminals to an available health care practitioner at one of the health care practitioner terminals, so that the available health care practitioner may carry on a two-way conversation with the patient and visually observe the patient.

Brief Description of the Drawings

The foregoing features of the invention will be more readily understood by reference to the following detailed description, taken with reference to the accompanying drawings, in which:

Fig. 1 is a flow chart illustrating a method for delivering medical examination, diagnosis, and treatment services in accordance with an embodiment of the invention;

Fig. 2 is a block diagram illustrating a system for delivering medical examination, diagnosis, and treatment services in accordance with another embodiment of the invention;

Fig. 3 is a block diagram illustrating a physician or other health care practitioner terminal in accordance with an embodiment of the present invention;

Figs. 4A and 4B are a flow chart illustrating a method for delivering medical examination, diagnosis and treatment services in accordance with another embodiment of the invention;

Fig. 5 is a flow chart illustrating a method for providing a covering physician service in accordance with a further embodiment of the invention; and

Fig. 6 is a flow chart illustration another method for providing a covering physician service in accordance with yet a further embodiment of the invention.

Detailed Description of the Specific Embodiments

Definitions. As used in this description and the accompanying claims, the following terms shall have the meanings indicated, unless the context otherwise requires:

"Acute", "episodic", and "non-urgent" are terms of art as used in the practice of medicine.

Emergency room overcrowding is partially due to the large volume of non-urgent care being provided by the emergency departments. Patients often access emergency rooms seeking care for conditions that clearly can be managed in other, less intensive settings. Some of these patients simply cannot get access to their own physicians. Patients who try to access their private physician (sometimes referred to herein as "practicing physician" for minor episodic illnesses often find that they cannot be scheduled for an appointment expeditiously or at a convenient time. Walk in clinics are not always located close by, and while the waiting time to be seen by a physician at a clinic may be less than in an emergency room, such a visit may demand two or more hours. Given the work schedule demands of today's consumer, private physician appointments, emergency department visits, and clinic visits do not provide for the optimal care of patients with acute non-urgent illnesses. Additionally, a bill for treatment of a minor complaint can easily exceed three hundred dollars, which may not cover the true cost of providing the medical care in a hospital setting. Managed care co-payments for these visits are sizable (fifty to seventy-five dollars) and, not infrequently, the insurer will refuse to pay for the visit in retrospect because the medical problem was minor.

The present invention allows for the remote triage of patients to appropriate settings, and at the same time, allows for treatment of acute non-urgent cases. (It should be noted that emergency physicians are best suited to perform the triage function of "sorting" patients into categories of emergent, urgent, and non-urgent conditions because they are specifically trained to manage and care for the full spectrum of conditions that cross all medical and surgical specialties. However, internists and family practitioners are also physicians capable of performing the triage function. Similarly, nurses and nurse practitioners, and physician assistants may also be capable of performing the triage function.)

Fig. 1 is a flow chart illustrating a method for delivering medical examination, diagnosis, and treatment services in accordance with an embodiment of the invention. In process 101, a call center, in accordance with this embodiment, a physician call center, is

provided. The physician call center provides integrated services digital network (ISDN) connections to a first plurality of physician terminals and a second plurality of patient terminals. (ISDN is a telephone communication standard for sending voice and digital data over digital telephone lines or normal telephone wires.) Although the embodiment of Fig. 1 utilizes an ISDN, any suitable network may be employed, including the Internet, a dedicated Local Area Network (LAN), System Area Network (SAN), Wide Area Network (WAN), or other facility.

The physician call center may be a single call center that provides international, national or regional connections, or it may be one of a plurality of physician call centers that are in communication with one another to provide such connections. A call from a patient is received at the physician call center in process 102, and the call is routed to an available physician or other health care practitioner. In one embodiment, the available physician must be a board certified physician who is licensed to practice medicine in the state wherein the patient is located. For example, if the patient is calling into the call center from Massachusetts, then the call center will route the patient's call to a physician terminal manned by a board certified physician who is licensed to practice medicine in Massachusetts. In accordance with another embodiment of the invention, the physicians' credentials, including licenses, may be displayed to the patient via a display device.

In process 103, the available physician (or other health care practitioner) is permitted to evaluate the patient's immediate complaint or reason for visit in order to make an assessment whether the patient may be suffering from an acute non-urgent condition. If such a condition may be present, an examination is conducted and treatment is prescribed in process 104. The examination is conducted via audio video equipment, such as video conferencing equipment, that allows the available physician to interact with the patient in real time in a confidential manner. The examination may include the assessment of the skin (including color and texture), nail beds, eyes and oropharynx of the patient via a video camera and a halogen fiber optic light source. Examples of acute non-urgent conditions include, but are not limited to, acne vulgaris, allergic rhinitis, aphthous ulcer, back pain, bronchitis, minor burns, cellulitis, constipation, contact dermatitis/rhus dermatitis, dental caries or infection, gout or pseudogout, herpes simplex (oral), herpes zoster, hordeolum or chalazion, insect bites or stings, known STD exposure (gonorrhea or chlamydia), Lyme disease (stage I, localized infection), otitis externa, acute otitis media, pharyngitis, scabies, sinusitis, smoking cessation, tendinitis or strain, temporomandibular

joint dysfunction syndrome, urinary tract infection (female, uncomplicated) and urticaria. The examination is conducted in accordance with a protocol that is discussed below.

Treatment may include home remedies and pharmaceutical remedies that may be prescribed immediately following the examination. If the patient is not suffering from an acute non-urgent condition, no treatment will be prescribed and the patient may be referred elsewhere as will be described with respect to Figs. 4A and 4B below.

Limiting treatment to circumstances where the patient is determined to be suffering from an acute non-urgent or other non-urgent condition is important because the examination and treatment of the patient are inherently limited by the fact that they are being conducted remotely, over a network. The inventors have found that assessment and treatment of non-urgent conditions are possible under these circumstances. Conversely, more serious illnesses, for example, a myocardial infarction, stroke, appendicitis, etc. in accordance with an embodiment of the present invention, are referred to suitable facilities for treatment, such as hospitals, primary care physicians, specialists, emergency rooms and clinics.

In addition, the diagnosis of a non-urgent condition may be conducted without a human or mechanical presenter at the patient terminal. In an embodiment of the invention, the examination is conducted by utilizing a video camera and examination light on a patient who is standing in the patient terminal. In this embodiment there is no need for additional medical instrumentality such as blood pressure readers, thermometers, electrocardiograms, pulse oximeters or the like, as diagnosis of an acute non-urgent condition may be accomplished by observing the patient's physical appearance and by orally obtaining a current history of the patient's illness. Of course, diagnosis of a non-urgent condition would not be precluded, or in any way hindered, by the addition of medical instrumentality.

Fig. 2 is a block diagram illustrating a system for delivering medical examination, diagnosis, and treatment services in accordance with another embodiment of the invention. The system includes a first plurality of physician (or other health care practitioner) terminals 221, 223, and 225 in communication with a second plurality of patient terminals 210 and 220 via a call center 215 and a network 213. As noted above, the network may be an ISDN network, or the network may be any other network capable of providing audio and video connections. The physician call center 215 includes one or

more routers 217 for routing patient calls to an appropriate and available physician terminal 221, 223, or 225.

Each physician terminal 221, 223, and 225 may also be in communication with a protocol database 235, patient database 233, or medication database 237, either locally or via one or more of the networks mentioned above (such as local area network (LAN) 231) and each database may be in communication with another database. When communication is over a network, typically the databases may be accessed via a server on the network. Further, each physician terminal may be in communication with one or more pharmacies, clinics, hospitals, emergency rooms, ambulance services, primary care physician facilities, or specialist facilities.

Each protocol database may include a protocol that guides a physician in conducting a patient evaluation and assessment. The protocol provides a series of segments pertinent to examination, diagnosis and treatment of a patient. For example, in the case of allergic rhinitis, the segment might be displayed to the physician via a display device 304 (see Fig. 3) as shown in Table 1.

Table 1

ALLERGIC RHINITIS

(Clinical Programs and Guidelines)

PRESENTING COMPLAINT:	Paroxysmal sneezing/nasal congestion
AGE RANGE:	6-65 years
MEDICAL HISTORY:	-Current medications (BCP?) -Past/Present medical problems? -Allergies -LMP/Pregnancy? -Previous treatment for same? -Social history: drugs, alcohol, smoking
PREDISPOSING FACTORS:	-Allergies to foods or medications -Environmental allergies: animal fur, plants, dust, molds etc.
SYMPTOMS:	-Paroxysmal sneezing (especially in a.m.) -Nasal congestion/clear rhinorrhea -Post-nasal drip

	-Tearing, itchy eyes -Cough
SIGNS:	-Allergic shiners -Allergic salute -Turbinate edema -Conjunctival injection -Clear nasal discharge
WARNING SIGNS:	-Fever > 101°F/tachycardia -SOB, wheezing* -Difficulty swallowing* * To ED immediately
DIFFERENTIAL DIAGNOSIS:	-Sinusitis -Nasal polyps -Cocaine use -Deviated septum
TREATMENT:	Usual course several weeks to several months *Primary*: Nasal Steroids -beclomethasone (Beconase): 1-2 sprays/nostril bid -fluticasone (Flonase): 2 sprays/nostril qd -budesonide (Rhinocort): 2-4 sprays/nostril qd *Alternative/Adjunctive*: Antihistamines: -loratadine (Claritin): 10 mg po qd (syrup 5 mg/5 ml) -cetirizine (Zyrtec): 10 mg po qd (syrup 5 mg/5 ml) -fexofenadine (Allegra): 60 mg po bid -dimetapp (OTC)

	-tavist (OTC) Mast-cell stabilizers: -cromolyn sodium (Nasalcrom): 1 spray/nostril qid
OTHER CONSIDERATIONS:	-Side effects of intranasal steroids include irritation and rarely nasal ulceration -Nasal steroids may take a few days to show response -May not need nasal steroids for mild disease -Immunotherapy best reserved for severe cases and for patients who are symptomatic for more than 6 months
DISCHARGE INSTRUCTIONS:	-To Emergency Department/Primary Care Physician if no improvement in 2- 3 days. -Give patient discharge instructions.
ASK IF ANY QUESTIONS OR COMMENTS	

Hyperlink text or other automated or electronic communication devices may be provided within the protocol to facilitate the transfer of information from the physician terminal to one or more third party. For example, if the physician detects one of the warning signs that indicate that immediate emergency care is necessary, he or she may click or double click on the warning sign, and communication may automatically be established between the physician and an ambulance service or emergency room. Similarly, if the physician deems that a prescription drug is appropriate for the treatment of the patient, the physician may click or double click on the appropriate prescription, such as one of the nasal steroids listed above, and the prescription will be forwarded to the pharmacy of the patient's choice along with instructions for use of the steroid.

More generally, the protocol involves, among other things, obtaining from the patient a history of the current illness or immediate complaint. An example of a general protocol for assessment of a patient is provided in Table 2 below.

Table 2

(General Protocol)

TREATMENT OF EXISTING CONDITION	
PRESENTING COMPLAINT:	Need drug prescription and/or medical advice.
AGE RANGE:	Greater than 5 years.
MEDICAL HISTORY:	-Current medication (BCP?) -Past/Present medical problems -Allergies -LMP/Pregnancy -Previous treatment for same current illness? -Social history: drugs, alcohol, smoking
REASONS FOR SEEKING PRESCRIPTION OR TREAMENT:	-Unable to secure timely visit with primary care physician -Medication replacement/refill -On vacation, forgot medications -Just moved, need refill until seen by new Primary care physician -Same condition present which was relieved in past by certain medications
SYMPTOMS:	-Are the symptoms or medical condition essentially the same as that for which the medication(s) were first prescribed? -Have any new (other) medical problems arisen since the medication(s) (in question) were last prescribed?

SIGNS:	-Any significant change in vital signs since last prescription filled? -Consider patient's present temperature, pulse, blood pressure and respiratory rate -Any significant change in physical appearance or physical findings since last prescription filled?
WARNING SIGNS:	-Any significant change in symptoms, vital signs, or physical signs from previously as patient presents to the available physician?
TREATMENT:	*Specific:* -Write R_x for patient if it seems appropriate *General:* -Use discretion in prescribing narcotics or sedative/hypnotic medication(s) (may need to check old records) -If prescribing narcotics, do not exceed 3-5 day supply -Use discretion in prescribing medication(s) for more serious conditions (e.g., cardiac, diabetic medication(s), etc.) and only prescribe enough to last until patient get to primary care physician/emergency department
DISCHARGE INSTRUCTIONS:	-To emergency department/primary care physician if any significant change in symptoms or physical findings occur while patient is on medication(s)
ASK IF PATIENT HAS ANY QUESTIONS OR COMMENTS	

The general protocol, as outlined above, involves obtaining from the patient: a history of his or her present or immediate illness; a past medical history, including current medications and allergies; a review of systems; and a social history. The protocol further

involves: conducting a physical examination on the patient (including by visual inspection); developing a differential diagnosis (i.e., a list of possible and probable diagnoses based on the history and physical examination); assessment for mitigating factors that may result in a change in treatment or referral to an alternative setting for treatment; treatment, which may consist of advice only or may result in the electronic transmission of one or more prescriptions to a pharmacy of the patient's choice; review of other considerations so as to tailor the patient's treatment based on the patient's condition, co-morbidities (e.g., diabetes mellitus), allergies, current medications and known side effects, and drug interactions; and a review of the diagnosis, treatment, and aftercare instructions with the patient, including disposition (i.e., referral for follow-up evaluation as well as transmittal of a synopsis of the present visit, with the patient's permission, to his or her private practitioner.)

When appropriate from the general protocol, the physician invokes condition specific protocols as necessary. The treatments listed in the condition specific protocols represent common, cost effective treatment for the corresponding conditions. However, in each case there are other acceptable treatments that fall within the standard care and which may be prescribed by the physician when indicated and appropriate based on the patient's condition and mitigating factors. The general protocol also applies to a patient whose condition is not entirely consistent with one of the existing protocols, but who nevertheless is clearly suffering from an acute non-urgent condition that is appropriate for treatment through this modality.

New condition specific protocols, with the corresponding aftercare instructions, may be added from time to time, and the existing protocols and aftercare instructions may be modified and updated from time to time. In each case, any additions and/or modifications will be synchronized throughout all call centers and physician terminals.

Each physician terminal may be in communication with a patient database 233 via a network such as LAN 231. The patient database includes a record of each patient who has used the system, as well as the diagnosis made and treatments prescribed for each visit. This patient database includes the patient's name, address, phone number and primary care physician as well as the name of any physician or specialist the patient has contacted via the system. By accessing a patient database, an available physician may obtain information vital to the patient's care and prevent the patient from abusing the system by obtaining multiple and unnecessary prescriptions. Further, the available

physician may have an assistant who may access the patient database for information related to a patient's general history or demographics.

The protocol, patient, and medication databases associated with the system may be used under suitable program control for purposes including:

1) providing a permanent record of each physician/patient interaction;

2) providing a permanent record of the demographics of all patients who utilized the services of the system;

3) guiding the available physician through the physician/patient interaction by means of:

   a) propriety protocols, including hyperlinks between medications recommended in the protocols and a medication database;

   b) various menus leading to the final prescription(s), if any, aftercare instructions, receipt and other information (such as work or school notes) provided to the patient;

   c) various advisories and warnings triggered by the choice of a specific medication and/or the patient's condition (such as pregnant, nursing, pediatric age range, etc.);

   d) allowing the physician to prescribe outside the standard protocols, when appropriate, by means of choosing medications directly from the database, and/or changing dosage, frequency and/or amount dispensed for medications chosen through the protocols;

   e) limiting the physician in any manner specified or programmed by the system administrator (e.g., limiting controlled substances to no more than twelve tablets);

   f) automatically adding the physician's name, facsimile signature, DEA number to prescriptions (based on a login or password);

4) allowing all call centers to interact so that:

   a) protocols, aftercare instruction sheets and the medication database are standardized at least every twenty-four hours;

   b) patient records are synchronized and updated frequently (e.g., every five minutes) so that each physician call center will always have a current patient record in the event that a patient utilizes more than on physician call center or patient terminal;

5) providing a Chief Medical Officer with a variety of quality practice/risk management reports on individual call centers, individual physicians and the system as a whole;

6) allowing the system administrator to update protocols, aftercare instructions, work or school notes, the medication database and any other appropriate component of the system;

7) allowing the system administrator to add new protocols, aftercare instructions, work or school notes and other appropriate components and to archive existing components;

8) allowing the system administrator to update the medication database by means of:

a) modification to existing medications, advisories, warnings and other parameters;

b) adding new medications, advisories, warnings and other parameters;

c) archiving existing medications, advisories, warnings and other parameters;

d) setting or changing limitations on existing or new medications (e.g., limiting amount dispensed);

9) limiting access to the databases to authorized personnel by means of a login, password, key or other device linked to an access level specified by the Chief Medical Officer;

10) limiting access to reports and functions that allow modification of the databases to the system administrator and those specified by the Chief Medical Officer or other executive.

The patient database, under suitable program control, may capture the following information on each patient:

1) demographic data such as name, permanent address, date of birth, phone number, work phone number, primary care physician (name, address, phone number, fax number), name of local hotel or motel, address, and phone number(if the patient is traveling);

2) basic medical information such as reason for visit, general appearance, pregnant, breast feeding known allergies and reactions;

3) a diagnosis based on the protocol chosen or as entered by the available physician;

4) any medication(s) prescribed by the available physician;

5) any work or school note provided by the available physician.

Additionally, one or more of the databases, under suitable program control, may capture the following information on each physician associated with the system:

1) name as it should appear on prescriptions and patient video screens, including degree (e.g., M.D., D.O.);

2) DEA number (which will be printed on prescriptions);

3) facsimile signature (which will be printed on prescriptions);

4) dates and times "logged in" and "logged out";

5) patients evaluated (number and names);

6) diagnoses made;

7) any other information necessary for designated reports.

Further, one or more of the databases, under suitable program control, may provide standard reports to be generated upon authorized demand such as:

1) for each physician call center and for all call centers combined:

a) total number of calls;

b) average number of calls per day and per operational hour;

c) average number of calls per time of day and day of week;

d) average duration of calls;

e) number and ratio/percent of new patients versus repeat patients;

2) for each patient terminal and third party entity (e.g., primary care physician, hospital, emergency room, ambulance service, clinic, specialist, and pharmacy):

a) calls originating from each terminal (total number of calls, average number of calls per day and per operational hour, average number of calls per time of day and day of week);

b) transmissions to each third party entity (total number of calls, average number of calls per day and per month);

3) for each physician (each item to be compared to system average for all physicians):

a) total calls and hourly average;

b) average duration of calls;

c) total prescriptions written and ratio/percentage of prescriptions to calls;

d) ratio/percent of "no changes" to total number of calls;

e) time in and time out (for payroll and to monitor timeliness);

f) hours worked;

g) prescriptions for controlled substances or other specified medications (total number and ratio/percent of total prescriptions for that physician);

h) prescriptions written for medications not in database;

4) for each physician assistant (each item to be compared to system average for all physician assistants):

a) total calls and hourly average;

b) average duration of calls;

c) time in and time out;

d) hours worked;

5) patient demographics:

a) number and percent of patients in various age ranges, to be specified;

b) average age of patients;

c) sex of patients (total numbers, ratio/percents);

d) average number of visits/calls per patient;

6) other reports as specified form time to time by the Chief Medical Officer or other system executive.

One or more of the databases, under suitable program control, may also provide the following functions when a physician is logged onto the system and a patient initiates a physician/patient interaction:

1) the physician and/or physician's assistant may be able to:

a) enter demographic data on a new patient via a keyboard or other input device;

b) access and update demographic information on an existing patient (one who has utilized the system in the past);

c) view the demographic information throughout the interaction via a display device;

2) the physician may be able to:

a) enter medical data on a new patient (e.g., allergies, current medications, pregnancy, breast feeding, etc.) via a keyboard or other input device;

b) view medical information from prior interactions on existing patients via a display device;

c) update information that may have changed since the prior visit (e.g., allergies, current medications, pregnancy, etc.);

d) make no modifications to the prior record of medications prescribed, diagnoses, or similar information;

3) the physician may view any existing protocols while interviewing the patient, and may switch to a different protocol at any time;

4) the physician may choose a medication listed in a protocol, thereby activating a hyperlink (or other communication link) to a medical database or pharmacy thereby creating a prescription for the medication that is forwarded to a pharmacy;

5) the physician may choose a third party to which the patient should be referred as listed in a protocol thereby activating a hyperlink (or other communication link) to the third party;

6) the physician may choose a work or school note listed in a protocol thereby activating a hyperlink (or other communication link) and generating the note, or the physician may initiate a note directly by entering the note into an input device thereby generating a note that is forwarded to the patient;

7) the physician may choose any medication directly by entering the medication the medication database via a keyboard or other device, thereby creating a prescription for any chosen medication that is then forwarded to a pharmacy;

8) the physician may bypass the protocol and medication databases and prescribe a medication by entering it directly on a prescription screen via a

keyboard or other input device thereby generating a prescription that is forwarded to a pharmacy (this may trigger a "red flag");

9) once a prescription(s) is generated there may be a review function by which the physician may:

   a) delete the prescription for any particular medication;

   b) change the dosage, frequency, amount dispensed or other parameters within any restrictions imposed (e.g., amount is restricted for controlled substances, the physician may prescribe less than the amount designated in the protocol but no more than the specified limit);

10) when a prescription(s) is transmitted to a pharmacy, the corresponding aftercare instruction sheet (based on the chosen protocol) and a receipt may be transmitted to the pharmacy or directly to the patient;

11) whenever a medication is chosen by the physician, the following information for that particular medication (contained in the medication database) may automatically be displayed to the physician (even if it does not appear on the prescription itself):

   a) any advisory or warning for that particular medication;

   b) "use in pregnancy" instructions (automatically if the patient information indicates the patient is pregnant);

   c) "use in nursing mothers" instructions (automatically if the patient information indicates that the patient is nursing);

   d) "use in pediatrics" instructions (automatically if the patient's demographic information that indicates he or she is in the pediatric age group); if the information for that medication specifies a particular age range or limitation ("not approved by persons 6 years or younger") a warning will be displayed to the physician if the patient meets the range or limitation;

12) the physician may electronically indicate the he or she has viewed the medication information outlined in 11) above (e.g., by clicking on an "OK" icon or field);

13) the database, under suitable program control, may allow simultaneous and serial use of the database by a physician and his or her assistant:

a) after the physician completes the medical interaction with the patient, an assistant may assume control of the open database, record demographic data if not previously recorded, verify a credit card transaction, and/or transmit a prescription(s), aftercare instruction sheet(s), and/or work or school note chosen by the physician;

b) the assistant may record demographic information either before or after the physician/patient interaction;

14) the database, under suitable program control, may interact with credit card reader software so that prescription(s), work or school notes and aftercare instruction sheet(s) are not transmitted until payment has been verified by the assistant or physician and the assistant or physician activates the transmittal;

15) the database, under suitable program control, may have the ability to:

a) place limitations on medications as specified by the system administrator (e.g., controlled substances may be limited to no more than twelve tablets, although fewer than twelve tablets may be prescribed at the physician's discretion);

b) identify specified medications (by color-coding, a message box or other means) that should be prescribed only when certain conditions are met (e.g., as a replacement for an existing prescription or when the patient has had previous experience with the same medication;

16) the database, under suitable program control, may have the ability to link the medication database to the patient database so that appropriate warnings regarding cross-allergies and/or medication interactions may be generated;

17) the database, under suitable program control, may have the ability to link to a video database in order to generate videos illustrating patient care and prevention techniques, such as generating a video displaying the proper way to lift a heavy object to a patient who is suffering from back pain.

Each patient terminal 210 or 220, which may be a kiosk or other portable unit, includes a work-station 212. A video camera 204 is in communication with the work-

station 212, as is an examination light 202 to provide an available physician with a clear visual view of the patient. The video camera is controlled by the available physician via the work-station in the physician terminal. The video camera enables the available physician to scan the patient vertically (in a "tilt" mode), scan the patient horizontally (in a "pan" mode), and provide the available physician with a detailed and magnified image of any part of the patient's body (in a "zoom" mode). A patient terminal 210 or 220 may also include a video display by which the patient may view the available physician, the available physician's name, written instructions supplied by the available physician, video instructions and the available physician credentials in real time. The patient initiates a call to a physician call center 215 by picking up a telephone handset 208. The patient terminal may also include a credit card reader 216 by which payment for services provided by the available physician may be made. Further, the patient terminal may include a keyboard 214 to allow a technician to configure and update the patient terminal. Patient terminals may be established in shopping centers, malls, supermarkets, department stores, gas stations, pharmacies, hotels, office complexes or other workplaces.

Fig. 3 is a block diagram illustrating a physician (or other health care practitioner) terminal in accordance with an embodiment of the present invention. Each physician terminal 221, 223, or 225 includes a work-station 310 in communication with the physician call center 215 and one or more databases, such as 233, 235, 237, a video display 304 by which to view the patient, and a headset 308. A physician terminal may also include a video camera 302. The video camera 302 allows a patient to view the physician attending the patient. The physician terminal may also include a facsimile device (not shown) by which instructions pertinent to patient care and treatment may be forwarded to a pharmacy along with a prescription in accordance with one embodiment of the invention. Similarly, such instructions may be sent over the network to a pharmacy via the work-station 310 and keyboard and mouse 306. The instructions may also be displayed to the patient via video display 206. An example of patient care and treatment instructions for allergic rhinitis is shown in Table 3.

Table 3

ALLERGIC RHINITIS (Aftercare Instructions)

Allergic rhinitis means congestion of your nose caused by environmental allergies (hay fever) and similar situations.

Please follow these instructions carefully:	-Take any prescribed medicines as directed. -Try to avoid whatever is causing the allergic reaction (such as staying indoors, with air conditioning, during heavy pollen season). -Most seasonal allergies can be controlled with medication and get better when you are no longer exposed to whatever is causing the allergic reaction (such as when the pollen count decreases). However, if you become worse in any way, get checked by your doctor, go to an Emergency Department or see an allergy specialist.
Go to an Emergency Department or see your own doctor right away if any danger signs develop, including the following:	-Swelling of your face, tongue or neck. -Pain or pressure over your sinuses (forehead or cheeks). -Fever (over 102°F), sweats or shaking chills. -Trouble breathing or swallowing. -Wheezing or hoarse voice. -New or worsening rash (hives). -Dizziness, fainting or feeling "flushed." -Chest pain or chest discomfort, including tightness. -Anything else that worries you.
Emergency Departments are open 24 hours a day for any problems.	

Figs. 4A and 4B are a flow chart illustrating a method for delivering medical examination, diagnosis and treatment services in accordance with another embodiment of the invention. In process 401, a call from a patient is received at the physician call center 215. The next available physician is identified 402 and the call is routed to the identified available physician at a physician terminal (such as 221, 223, or 225) in process 403.

When the patient calls the physician call center and an available physician has been identified, the patient is provided with a video and audio link, which may include a video display 206, to the physician in process 404. Similarly, the physician is provided with a video and audio link to the patient in process 405. Any patient information that may be stored in the patient database 233 is accessed by the available physician in process 406. Such information is accessed to provide the available physician with a history of the patient, any conditions or illness the patient has been treated for, and any medications that the patient has been prescribed.

In process 407, the patient is notified that the visit will be recorded. Recording the visit provides information for the patient database and insures the integrity of the care that the patient receives. An evaluation of the patient's immediate complaint or reason for the current visit is performed by the physician in order to make an assessment as to whether the patient may be suffering from an acute non-urgent or other non-urgent condition in process 408. If the patient is not suffering from such a condition, the patient database 233 will be updated and the patient will be referred to a primary care physician, specialist, emergency room, ambulance service, clinic, or home in process 420. As discussed above, this can be accomplished through hyperlink connections (or other electronic connections) available to the physician via the system.

If the available physician determines that the patient may be suffering from a non-urgent condition, an examination is conducted 409 using the protocol segments accessed from the protocol database 235. (The protocol segments may provide the physician with advisory or warning messages as discussed above.) The available physician (or other health care practitioner authorized to do so) will assess whether a prescription is necessary to treat the condition. If a prescription is necessary, the available physician will transmit the prescription to the patient or to a pharmacy that the patient prefers, along with instructions for proper use of the prescription, aftercare instructions, and any necessary notes as described above, via hyperlinks or other electronic connections (process 430). Following transmittal of the prescription and instructions to the pharmacy, the patient database will be updated, in process 410, with a record of the visit, including diagnosis and treatment. If no prescription is necessary, the patient database will simply be updated 410 with a record of the visit and diagnosis.

In process 411, instructions pertinent to the patient's condition and treatment are reviewed with the patient and these instructions may be displayed to the patient via the

video display 206. As noted above, video demonstrations related to the patient's care and treatment may be displayed to the patient as necessary. Credit card or insurance information is obtained from the patient in process 412, either by the physician or an assistant. The patient is asked if he or she would like information regarding the visit to be sent to his or her primary care physician and if he or she so desires, the information is transferred, via hypertext link or other electronic connections, in process 440, to the primary care physician. Any closing questions, comments or concerns of the patient are addressed in process 413 and the visit is ended.

Figs. 5 and 6 are flow charts illustrating embodiments wherein the systems and methods described with respect to Figs. 1-4 may be used to provide a covering physician service via a network. Such a covering physician service may be offered by, for example, a physician, a health care management system (such as a healthcare management organization ("HMO"), a preferred provider organization ("PPO") or a point of service plan system ("POS")), a health insurance provider, a hospital, a clinic, a nursing home or other health care facilities. Such a covering physician service may be provided by a physician or other health care practitioners as may be authorized or allowed by law.

In accordance with the method illustrated in Fig. 5 if the patient is unable to access his or her primary care physician (or another practicing physician providing care to the patient) a call from the patient is received in process 501 by an answering service associated with the practicing physician. The answering service determines, via information provided by the patient, whether the patient is exhibiting symptoms of an emergent condition, and if so, the answering service contacts 911 emergency service or some other emergency service in process 510. If it is determined that the patient in not exhibiting symptoms of an emergent condition, the answering service may then determine, via information provided by the patient, if the patient is exhibiting symptoms of a non-urgent condition. If the patient is exhibiting symptoms of a non-urgent condition, the answering service will inform the patient, in process 502, that he or she may use the patient terminals for immediate treatment of the condition. The patient may then decide to use a patient terminal, wait to talk to or to see the practicing physician, or go to an emergency room or a clinic. If the answering service determines that the patient is exhibiting symptoms that are not related to a non-urgent condition, the answering service may refer the patient, in process 511, to an emergency room, a clinic, or to the practicing physician (when the practicing physician is available) for treatment.

If the patient decides to use one of the patient terminals, then, in process 503, a call from the patient at one of the patient terminals will be received by a call center. The call center enables any of a first plurality of physician or health care practitioner terminals to be in audio-visual communication over the network with any of a second plurality of patient terminals and the call center will route the call to a physician or other health care practitioner at a physician or health care practitioner terminal. As described in connection with the physician call center of Fig. 1, the call center provides integrated services digital network (ISDN or Internet, LAN, SAN or WAN or other digital facility) connections to a first plurality of physician or health care practitioner terminals and a second plurality of patient terminals. Here again, the call center may be a single call center that provides international, national or regional connections, or it may be one of a plurality of call centers that are in communication with one another to provide such connections. The physician or health care practitioner is then permitted, in process 504, to assess the patient and to treat the patient in the manner described with respect to Figs. 1-4 above.

Fig. 6 illustrates an embodiment that is a variant of that of Fig. 5, and is substantially identical except that, in this embodiment, the physician or other health care practitioner is provided with access to patient medical information. Here again, if the patient is unable to access his or her primary care physician (or another practicing physician providing care to the patient) a call from the patient is received, in process 601, by an answering service associated with the practicing physician. The answering service determines whether the patient is exhibiting symptoms of an emergent condition, and if so, the answering service contacts 911 emergency service or some other emergency service in process 610. If it is determined that the patient in not exhibiting symptoms of an emergent condition, the answering service may then determine if the patient is exhibiting symptoms of a non-urgent condition.

If the patient is exhibiting symptoms of a non-urgent condition, the answering service will inform the patient, in process 602, that he or she may use the patient terminals for immediate treatment of the condition. Again, if the answering service determines that the patient is exhibiting symptoms that are not related to a non-urgent condition, the answering service may refer the patient 611 to an emergency room, a clinic, the practicing physician (when the practicing physician is available) for treatment.

If the patient decides to use one of the patient terminals, a call from the patient at one of the patient terminals will be received, in process 603, by a call center. Here again,

the call center enables any of a first plurality of physician or health care practitioner terminals to be in audio-visual communication over the network with any of a second plurality of patient terminals. The call center will route the call to a physician or other health care practitioner at a physician or health care practitioner terminal and information related to the patient (such as an electronic medical record) will be received at the physician or health care practitioner terminal via the network. The information may be forwarded via a computer or database in the practicing physician's office or by a computer or database associated with a the practicing physician, a health care management system or other health care facility or an insurance provider. The physician or health care practitioner is then permitted to assess the patient, to treat the patient accordingly, and to forward updated information related to the patient (such as examination, treatment and prescription details related to the patient's visit to the patient terminal) to the practicing physician via the network in process 604.

The described embodiments of the inventions are intended to be merely exemplary and numerous variations and modifications will be apparent to those skilled in the art. All such variations and modifications are intended to be within the scope of the present invention as defined in the appended claims.